

Public Health Model for Referral Chain Network and Preventive Interventions among Dialysis Patients of Developing Countries: A Retrospective Cohort Study

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ABSTRACT

The purpose of the study was to determine the usefulness of dialysis in minimizing further renal failure among the registered patients for dialysis and suggest measures for increasing outreach of dialysis services in developing countries like India. We considered six year retrospective study of a tertiary care hospital as representative data set. Review of the medical records was done manually and analyzed statistically. Whereas regularity of attending preset sessions is in resonance with the lessened health complaints reported (OR 0.0109; 95% CI 0.0029-0.041), the regular blood urea serum creatinine testing also ensures lesser referral needs (OR, 0.0089; 95% CI 0.0022-0.0351). It has been observed that cases with weight gain since previous session are closely related to comorbid conditions, especially joint pains, GIT disturbances and involvement of respiratory system. The profile of dialysis facility, pre and post dialysis monitoring mechanisms, if standardized, has little effect on the morbidity pattern. The morbidity among dialysis patients is inversely proportional to the regularity of attendance and timely clinical intervention(s), as needed in individual case.

KEY WORDS: cohort, dialysis, end stage renal disease (ESRD), morbidity, preventive intervention

INTRODUCTION:

The cases of renal failure, acute and chronic both, are having End Stage Renal Disease (ESRD) specially among those suffering from high blood pressure and diabetes.^[1,2] Early diagnosis in cases of Renal Failure can be successfully treated using Hemodialysis (HD) and Peritoneal Dialysis (PD), followed by Renal Replacement Therapy (RRT) if required.^[3] The cost of Dialysis ranges between 1,500-3,000 INR, which is comparatively high to be afforded by rural and tribal population.^[3] Case studies done on ESRD patients have revealed that such condition not only accelerates Cardiovascular Diseases, but also suppresses Immune System that may result in other severe clinical outcomes, ultimately causing death.^[4]

Factors influencing the survival of ESRD patients such as initiation of dialysis, timing & inter-dialysis time need to be thoroughly investigated for Human Welfare.^[5,6]

Studies on ESRD patients may prove to be of great significance as these patients require special care to manage chronic illness and for better recognition of the associated clinical symptoms.^[7,8,9,10,11,12] The impact of early start versus late start^[13,14,15,16] on dialysis patients with cardiac morbidity and Diabetes is also important. The study of socio-demographic profile of Dialysis patients of Central India is also useful for suggesting the development of a support system^[17,18,19] to provide health care services^[20,21] to the reachable and unreachable Dialysis patients with special attention to ESRD, so as to minimize the associated and subsequent risks.

Therefore, the objectives of this study included: (a) determine the usefulness of dialysis in minimizing further renal failure among the registered patients for dialysis; and, (b) give suggestions for increasing the outreach of Dialysis.

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MATERIALS AND METHODS:

A retrospective cohort study was conducted at Dialysis Unit of a tertiary care centre after all necessary clearances from Institutional Ethical Committee and Research Advisory Committee. Inclusion Criteria for the samples included all dialysis patients of either gender above 30 years including patients with hemodialysis history reported during last 6 years. Exclusion criteria for the study was the patients below 30 years of age, severely ill patients who left against medical advice, habit of smoking, and alcohol consumption. Cohorts selected from amongst the dialysis patients facilitated classification of cohort members according to the degree and duration of exposure to the suspected factor for subsequent analytical study.

Detailed history including age, gender, mode of initiation, date of starting dialysis, number & duration of hospital admissions, number & severity of comorbid conditions, trend of serum creatinine, urine analysis (looking for proteinuria, hematuria), edema, or any kidney infection were taken into consideration. Systemic Examination was done for assessment of clinical condition of the dialysis patients and to rule out any complications. All patients with renal disease routinely underwent, at the dialysis centre, an assessment of renal function by estimating Glomerular Filtration Rate (GFR) from the level of serum creatinine. This measurement was used to evaluate degree of renal impairment, to follow the course of the disease, and to assess the response to therapy.

Data Collection Procedure:

The retrospective study was based on the review of the medical records comprising of medical examination, biochemical investigations and special tests. Serum Samples obtained routinely at the dialysis centre to measure Haemoglobin, HbSAg, Complete Blood Count, HIV and Kidney Function Test in addition to electrolyte, pre-albumin, albumin and creatinine. Patient reports including behavior, physical activity, health-related quality of life, dietary intake & nutritional status were also studied.

Selection of Comparison Groups:

No outside comparison group was taken in the study, however, the comparison group was in-built in the cohort since the single cohort was selected in the study.

Follow-up:

This prospective cohort study was undertaken for the

shortlisted 52 patients reporting and identified for dialysis procedures on regular basis. No efforts were actually needed to minimize the losses to the follow up since the patients were found to be sincerely and almost regularly reporting to the dialysis centre for dialysis sessions over time. Study was planned so as to minimize the losses due to improper follow up. Frequent visits to the dialysis centre, establishing a rapport with the dialysis technicians, and reviewing the records for migration, death or change of residential address were regularly recorded. However, to our surprise, it was not actually required for the stated purpose. The data was updated regularly based on the information collected during the follow up period.

Instrument in use for Dialysis:

4008S Classix (Fresenius Medical Care) was used in the dialysis centre.

Confidentiality and Ethical Considerations:

The confidentiality of all the personal information of dialysis patients was maintained during and after the study including publication of results. Ethical issues were addressed as per prevailing standard ethical guidelines and practices after obtaining due clearance by the Institutional Ethical Committee.

Analysis:

Data was analyzed using Epi Info™ 7.1.4, a free software tool available at CDC (Centre for Disease Control) website: <http://www.cdc.gov/epiinfo/7/>

RESULTS:

There is preponderance of male cases (73.08%) as compared to female patients reporting for dialysis (26.92%). The need for multiplicity and repeatability of dialysis sessions at very frequent intervals is a challenge initially for adjusting the life situations and later for making it a ritual to get admitted in the hospital and go through the rigorous process of dialysis sessions generally not lasting less than 4 hours per session. Even reporting of youth with renal failure is not uncommon. Hence, young age is not exempted from dialysis requirements and it also doesn't immune one to event free dialysis sessions. About half (48.08%) cases are under Dialysis within last 1 year, whereas 25%, 17.31% and 09.61% cases are under Dialysis since more than 3 years, between 1 years and 2 years and between 2 year and 3 years respectively.

From our retrospective study, it is appreciable that only around 7% cases are reporting to the Centre

with some health complaints with 82.69% having mild oedema. As usual, 75% cases report with weight gain since previous sessions, however the data depicts that the cases with joints pain, GIT disturbances and respiratory system related health problem are 03.85%, 05.77% and 09.61% respectively. It is also observed that the fluctuations in blood pressure, especially on the lower side, affects the well being and quality of life of the patients undergone dialysis. Most of the patients, while reporting most of the times to dialysis centre, have mild to moderate oedema of feet. This oedema is irrespective of history of hypertension or existing hypertension in the patients. There is satisfactory status of regular blood urea and serum creatinine testing (92.31%) and hence probably there is sufficient satisfactions level among the beneficiaries and the health related issues are minimally observed. Occasionally, the cases require referral to higher Centres (9.61%) and that too on only few occasions. The cases lost their weight (0.74 Kg mean) and is a usual finding of within limits.

Whereas regularity of attending preset sessions is in resonance with the lessened health complaints reported (OR 0.0109; 95% CI 0.0029-0.041), the regular blood urea serum creatinine testing also ensures lesser referral needs (OR, 0.0089; 95% CI 0.0022-0.0351). It has been observed that cases with weight gain since previous session are closely related to comorbid conditions, especially joint pains, GIT disturbances and involvement of respiratory system.

Table 1: Distribution of the dialysis cases at Dialysis Centre.

Gender	Number	Percentage
Male	38	73.08
Female	14	26.92
Survival since first dialysis	52	100.0
Total	52	100.0

Table 2: Duration since first dialysis among dialysis cases.

Months on dialysis	Number	Percentage
<12	25	48.08
12 to 24	09	17.31
25 to 36	05	09.61
>36	13	25.00

DISCUSSION

Among the dialysis cases reported at the Dialysis Centre under study, none of the cases are found reported to have expired during last 3 years.

Hence, it may be generally inferred that the facility, services and infrastructure provided by the Dialysis Centre is optimum for basis support services to the patients of Acute Renal Failure (ARF) and Chronic Renal Failure (CRF), as is mentioned as required facility support for dialysis by Pierratos A¹⁴. Gender wise preponderance of dialysis sessions among males has been found. However, on closer scrutiny it may be seen as a result of trends of a dialysis centre and may not be generalized for the purpose of interpretation or establishing special facilities for the same. Our study shows that continuing to possess same health status, if not showing rise in well being of the patients, depends on regularity in adhering to the prescribed schedules of dialysis sessions. This is in resonance with the US Renal Data System Annular Data Report¹⁹.

Table 3: Total number of dialysis sessions undergone till date among dialysis cases.

Number of Dialysis Sessions	Number	Percentage
<11	21	40.38
11 to 40	12	23.08
41 to 100	05	09.61
101 to 200	08	15.38
201 to 300	04	07.69
>300	02	03.85

Uehlinger DE et al²⁰ has observed that a cautious approach is needed for continuous and intermittent renal replacement therapy for ARF. However, its alarming from our study that there are cases who have undergone Dialysis at the same Dialysis Centre for more than 300 times and therefore there is a requirement to take special care of those who are reporting regularly for Dialysis for years together. As is evident from the data shown (Table 3) that 26.92% cases have already undergone Dialysis sessions for more than 100 times. About 40% cases have undergone Dialysis sessions for less than 11 times indicating that a large number of influx of cases is there in the Dialysis Centre recently. The cases coming regularly for dialysis sessions are not always reporting for the scheduled sessions. They seldom get complaints viz swelling, breathlessness, chest pain and shivering, while reporting to the dialysis centre. In some cases, breathlessness continues despite successful dialysis session. And, these cases are generally obese, non responders to treatment and suffering from non communicable diseases viz. hypertension, diabetes, atherosclerosis etc.

Table 4: Pre-session observations among dialysis cases.

Clinical Status	Present n (%)	Absent n (%)	OR	95% CI
Pre-session*				
Regularly attending preset sessions	46 (88.46)	06 (11.54)	0.0109	0.0029-0.041
Reporting health complaints	04 (07.69)	48 (92.31)		
Mild Oedema	43 (82.69)	09 (17.31)	0.0223	0.0069-0.0717
Moderate Oedema	05 (09.61)	47 (90.39)		
Cases with weight gain since previous session	39 (75.00)	13 (25.00)	0.0435	0.0151-0.1252
Comorbid conditions since first session	06 (11.54)	46 (88.46)		
Comorbid conditions since first session	06 (11.54)	46 (88.46)	0.3067	0.0589-1.5963
Joint pains	02 (03.85)	50 (96.15)		
GIT disturbances	03 (05.77)	49 (94.23)	1.7376	0.3931-7.6811
Respiratory System	05 (09.61)	47 (90.39)		
Regular Blood Urea Serum Creatinine testing	48 (92.31)	04 (07.69)	0.0089	0.0022-0.0351
Referral needs	05 (09.61)	47 (90.39)		
During the Sessions*				
Heparin regularity	52 (100.0)	Appropriate		
NA Profiling	52 (100.0)	Appropriate		
UF Profiling	52 (100.0)	Appropriate		
Average Blood Flow Rate	248.84	Appropriate		
Average Dialysate Flow Rate	500.00	Acceptable		
After Session*				
Average Post HD Weight loss (in Kg)	0.740			
Cases of Controlled BP Post Dialysis	49 (94.23)			
Cases of aggravated renal complaints	01 (01.92)	Within limits		
Fulfilled demand of dialysis sessions by patients**	52 (100.0)			
Dialysis Facility Survey*				
Staff Vaccination Status: Hepatitis	97% (Remaining Unknown Status)			
Water treatment: Chemical	100%			
Preventive maintenance of facility and equipments	Regular	Within limits		
Usual corrective measures	Regular			

*depicts various areas and levels of dialysis interventions; **depicts demand fulfillment for dialysis; however, limited data availability on actual hospital system needs requires careful scrutiny for assessment of future requirements for dialysis sessions in the community.

Hakim RM et al²³ have rightfully identified areas of concern for dialysis frequency and dialysis time for ensuring minimal health complaints. Lim WH et al¹⁰ has mentioned the adverse effect of uremia in their study. However, our study emphasises that the

observance of series of uneventful dialysis sessions, spread over prescribed time intervals, is no assurance for an uneventful dialysis session at a later date. Hence, efforts for capacity building of dialysis technicians including their training, re-orientation,

interaction with subject experts, hands on experience at centers of higher learning and emergency preparedness should be intensified. In addition, the complications occurring in the patients undergoing dialysis include but are not limited to generalized anasarca, abdominal distension and weakness.

National Kidney Foundation Guidelines published for chronic kidney disease⁶ underlines the need for ensuring blood parameters to the optimum permissible levels. In our study, the average blood flow rate (248.84) and average dialysis flow rate (500) have been within acceptable limits. Weight loss is commonly observed in all the cases after dialysis, however care should be taken to assess the loss gradient during series of dialysis sessions of individual patients reporting regularly preferably for more than 6 months.

The Dialysis facility survey spread over the study period release that the chemical water treatment and staff vaccination status is satisfactory (Range 97-100%). The preventive maintenance of facility and equipments as well as usual corrective measures for the same have been found to be regular. Patients registered for dialysis generally adhere to their prescribed schedule; however, there are few (3%), who are not well conversant with the necessity and compulsion of dialysis till they succumb to the urgency thus created by delay and denial for visiting the dialysis centre. Planned sessions are run for 4 hours during every visit and are usually conducted during day time. It has also been observed that the patients have inclination towards the technicians who have conducted dialysis on them earlier as well. Such confidence may also assist the health care managers supervising and guiding the dialysis provider technicians to motivate, encourage and involve the patients for observing good practices norms and provided guidance for their long term welfare and effectiveness of the procedures undertaken during consecutive sessions of dialysis. Conducting pre planned sessions for registered cases is observed to be a hassle free, effective and efficient strategy at Dialysis Centre.

Uchino S et al¹⁵ has already emphasized the need for carefully addressing the issues of ARF in critically ill patients and our observations in this study are also appreciative of the same. Psychosocial issues, although remain to be addressed at wider horizon and with training & skills, were generally not seen except in few cases and that too during few sessions only linked with their personal preferences for their participation, involvement and activeness in socio-religious programmes.

Based on the findings of this study, it may be concluded that there is need for capacity building, capacity enhancement, resource enrichment, facility expansion, active surveillance for prospective un-referred beneficiary identification, personalized attention to the patients, improving linkage mechanisms of dialysis centre with the patient and his relatives through modern electronic means and ensuring specific measures through community participation for primordial and primary prevention. The tools for behavior change communication and other relevant public health interventions may be developed and applied in the available health care settings of government, semi-government and private health care providers. A flow chart for referral chain network and preventive interventions suggested herein in this study may be adopted as a workable solution to early diagnosis and necessary dialysis assistance to the acute and chronic renal failure patients of remote rural, tribal and hard to reach population.

There is felt need for regularity and completeness of adherence to the routine and special investigation protocols by the patients for each session of dialysis. This should be done prior and after the dialysis for comparative evidence based assessment of the biomedical parameters vis a vis physiological parameters. However, costing of the investigation and naturally its burden on the beneficiary needs to be addressed from a larger societal perspective, wherein hospital costs of the dialysed person is borne by the Insurer, Government, Philanthropic Organizations or Individual donors. This shall surely improve the status of patients in terms of regularity for attending all the planned sessions, necessary investigations, medications and post dialysis support in the form of home assistance and community involvement.

The Governments of developing nations assisted by other healthcare stakeholders should prepare a policy for making available cost-effective, efficient, workable and replicable model of intervention resulting in early and appropriate diagnosis of patients needing Dialysis across health care beneficiary settings. The policy should essentially include but not be limited to those who cannot afford costs of repeated dialysis. The Universal Health Insurance may take care of such health issues as well through an authorized early response and assistance mechanism set up preferably at each district headquarter level.

CONCLUSION:

Conclusion: The profile of dialysis facility, pre

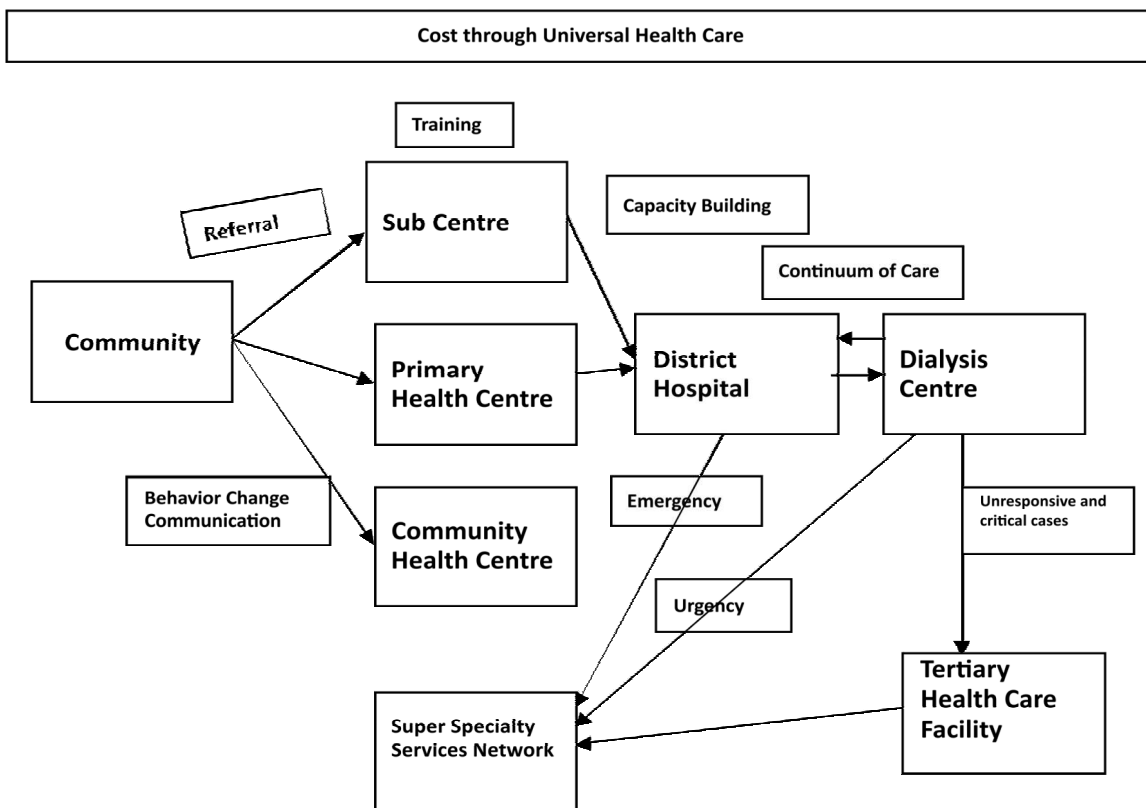


Figure 1: Suggested model for referral chain network and preventive interventions.

and post dialysis monitoring mechanisms, if standardized, has little effect on the morbidity pattern. The morbidity among dialysis patients is inversely proportional to the regularity of attendance and timely clinical intervention(s), as needed in individual case.

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Cite this article as: Gumashta R, Gumashta J, Khan SM, Jain R: Public Health Model for Referral Chain Network and Preventive Interventions among Dialysis Patients of Developing Countries: A Retrospective Cohort Study. *PJSR* ;2018;11(1):55-61.

Source of Support : Nil, Conflict of Interest: None declared.